

investigations extending over large areas are so great that it would be a decidedly retrograde policy that such cooperation should be abandoned. In support of the opinions expressed above, the council adduce the following statements and arguments with reference to sections (1) and (2) respectively, and believe that the statements will be fully substantiated in the detailed reports on the international investigations already published or in course of preparation.

(1) In conformity with the main object of British participation in the international scheme of investigations, as explained in the House of Commons by Mr. Gerald Balfour on June 12, 1902, and in accordance with resolutions of the International Council at Copenhagen in July of the same year, the investigations carried out in the North Sea by the association, at the request of H.M. Government, have been largely concentrated upon the biological aspects of the undersized-fish question, especially as concerns the supply of plaice.

By means of nearly 1000 hauls of the trawl the sizes of the plaice in different parts of the southern North Sea have been determined in detail and mapped out for different seasons of the year. The measurements of plaice recorded at sea on the *S.S. Huxley* exceed a total of 100,000. These investigations have clearly revealed the distribution of the various sizes of plaice in the English area during the period of investigation, and have contributed extensive material towards the collective report on this subject which is in preparation by the International Committee.

The causes which influence this distribution have been carefully investigated with respect to (1) depth; (2) nature of sea-bottom; (3) character of the food-supply; (4) growth, age, sex, and maturity; (5) locality of the nursery and spawning grounds; (6) seasonal migrations; (7) density of fish-population; and (8) intensity of fishing; and on most of these points definite results have been obtained.

By means of experiments with more than 7000 marked plaice the migrations of this species have been plainly traced in important areas, and much progress has been made towards the explanation of the observed movements.

The same experiments have furnished important results concerning the rate of growth in the chief parts of the English area.

An examination of the otoliths of more than 12,000 plaice caught and measured during the trawling investigations has yielded much new information concerning the age of plaice at different sizes on the chief fishing grounds, and has indicated a valuable method of controlling the results obtained from the marking experiments.

The marking experiments have afforded a new factor for estimating the intensity of fishing under modern conditions, and for measuring differences in this respect in different regions. In the case of medium-sized plaice (10-15 inches in length), we have found that out of 1100 fish of this size liberated at various seasons of the year in the southern area, where sailing trawlers predominate, approximately 30 per cent. have been recaptured within one year from the date of liberation, and that out of 400 fish similarly set free on the Dogger Bank and adjacent grounds, where steam trawlers predominate, about 40 per cent. have been recaptured in the same period.

The council regard these results as of great significance from a practical, as well as a scientific, standpoint, especially as there is reason to believe that the figures understate the full severity of the fishing.

Other results derived from the marking experiments and otolith investigations throw new light on the relative mortality of the two sexes, their habits of seasonal segregation, and their relative susceptibility to capture by the trawl, points which bear directly upon the problem of the effects of trawling upon the economy, and therefore the supply, of this species.

By the transplantation of large numbers of small marked plaice from the coastal waters to the Dogger Bank and other grounds, it has been found, during two years in succession, that the rate of growth is much greater on the Dogger Bank than on the nursery grounds, and the consideration of other factors renders it highly probable that the supply of fish can be profitably influenced by the transplantation of small plaice on a commercial scale.

A number of special experiments have been carried out on the *Huxley* to determine the vitality of trawl-caught

plaice of different sizes. Owing to the variety of the conditions which influence the experiments, it is not possible at present to express these results in a single set of figures representative of average conditions, but the experiments support the opinions (1) that under commercial conditions of trawling on the nursery grounds a large proportion of the small plaice taken are mortally injured, and would not live if returned to the sea, and (2) that the beam trawl is less injurious than the otter trawl under similar conditions.

With respect to other food-fishes, such as cod, haddock, sole, turbot, &c., a complete register has been kept of the catch of the large commercial trawls on every occasion (between 900 and 1000 hauls), and about 250,000 measurements, exclusive of those of plaice, have been recorded. The information thus acquired has laid a broad basis of exact and trustworthy knowledge concerning the general features of the fish-populations of different fishing grounds, and concerning the size, weight, and to some extent the rate of growth of the various species represented.

This information has been supplemented by more than 700 experiments with fine-meshed nets and dredges for determining the character of the sea-bottom itself, the dominant features of the bottom fauna, and the distribution of the fish eggs and fry which escape the commercial nets. In particular cases experiments have been carried out on the migrations and rate of growth of marked fishes, especially of cod, sole, lemon sole, and latchet, and the relation of size to age in the case of cod and sole has been studied to a certain extent by means of otoliths. Extensive observations have been made upon the food of many species in different localities, and concerning their relations to one another either as prey, competitors, or enemies.

With regard to the hydrographic and plankton investigations specified in the international programme, the association has fully carried out its obligations in this respect by the most thorough and painstaking investigation of the waters of the English Channel. The results have been regularly forwarded for incorporation in the quarterly charts and records issued by the Bureau of the International Council, and have been reported on from year to year.

(2) In view of the fact that special research has been mainly concentrated hitherto upon the plaice, and that other valuable species present points of practical importance which still await solution, especially the sole, turbot, cod, and haddock, it is very desirable that the investigations which have been begun on these species should be continued and developed.

In this connection the council would point out that the necessity of scientific investigations has been generally recognised, whether such investigations be or be not carried out under a scheme of international cooperation.

While the council have indicated above the substantial progress which has been made with the experimental work at sea under their control during the past few years, they strongly urge that if this work should be brought to a sudden conclusion the prospective value of much preliminary labour and expense would be lost. Continuity of work is a factor of more than usual importance in experimental investigation of this character, not only because the conditions of the phenomena are constantly changing, but also because the extent and value of the results likely to be obtained are largely dependent on the experience of the staff employed.

NOTES.

M. MASCART is retiring from the position of director of the Central Bureau of Meteorology in Paris. He will be succeeded on January 1, 1907, by M. Angot.

MR. L. A. PERINGUEY has been appointed to the directorship of the South African Museum, Cape Town, to fill the vacancy caused by the resignation of Mr. W. L. Sclater. Mr. Peringuey, who has been assistant director for some years, is a well-known entomologist, and author of many papers on South African Coleoptera and other insects.

MADAME CURIE'S opening lecture to the students attending the course in general physics at the Sorbonne on November 5, on the subject of "Les Théories modernes relatives à l'Electricité et à la Matière," has been published in full in the issues of the *Revue scientifique* for November 17 and 24.

DR. E. SYMES-THOMPSON, Gresham professor of medicine, and an authority on pulmonary diseases, died on Saturday, November 24, at the age of sixty-nine.

SIR RICHARD FARRANT, who died on November 20, at seventy-one years of age, was treasurer of University College, London, which owes much to his business capacity. It was largely due to him that the fund was started to raise 200,000*l.* to provide for the necessary buildings and financial arrangements required for the incorporation of the college and the University of London, and his exertions in connection with the scheme will not readily be forgotten.

THE New Zealand International Exhibition was opened on November 1. The exhibits are valued at three-quarters of a million sterling, and two-thirds of this value represents industrial exhibits. The exhibition is the largest that has ever been held south of the equator.

THE winter meeting of the American Association for the Advancement of Science is to be held this year in New York City. The first general session will be opened at Columbia University on the morning of December 27. The president of the meeting will be Dr. W. H. Welch. The sectional meetings will begin in the afternoon of the same day, and in the evening Dr. C. M. Woodward, the retiring president, will deliver his address. The meetings will be continued on December 28 and 29, and if necessary on December 31.

VISITORS to the old Swedish cathedral and university town of Lund will find no little interest in the comparatively recent collections at the ethnographical museum illustrating many phases of rural life. Old peasant houses have been taken down, brought from considerable distances, and set up at Lund, among the buildings being an old church and an inn. Models of interiors of houses with costumed figures of inmates give an excellent idea of rustic conditions, reminding one, though on a smaller scale, of the Cecho-Slavonic museum in the Kinsky park at Prague. No catalogue of the collections has yet been issued.

It is pleasing to note, from the current issue of its Bulletin, that the useful Société d'Encouragement, which is now in the 105th year of its existence, is in a satisfactory financial condition. After several years of deficit, the accounts for 1905 show a substantial excess of income over expenditure. The Bulletin contains useful summaries of recent progress in chemistry and mechanics, and affords clear evidence of the admirable work that is done by the society towards the development of the French national industries.

THE Home Secretary received at the Home Office on November 22 a deputation of members of the Royal Commission on Coal Supplies, who asked that the records and estimates which they have prepared at great cost to the country should be kept up by the Geological Survey to prevent their labours from being almost abortive. Lord Allerton believes that the whole of the information required could be had at a cost of 1000*l.* or 1500*l.* a year. Mr. Gladstone, while replying in sympathetic terms, pointed out that the Home Office is not properly equipped for

cooperating with the work suggested, and he is afraid there may be difficulty in obtaining monthly returns. Lord Allerton, however, thinks that the difficulty is exaggerated, because, as chairman of a railway company, he has found that monthly returns can be obtained without increase of staff and without having to pay overtime.

IN connection with the fourth International Fishery Congress which is to meet in the City of Washington during September, 1908, a number of competitive awards has been arranged for the most important investigations, discoveries, or inventions during 1906, 1907, and 1908, relative to fisheries, agriculture, ichthyology, fish pathology, and related subjects. The awards will be in the form of sums of money varying in amount from 12*l.* to 50*l.* The competition is open to any person, association, or company. Papers may be written in English, French, German, or Italian. The congress reserves the right to publish, prior to their publication elsewhere, any papers submitted in competition, whether such papers receive rewards or not. The awards will be announced at a session of the congress. All communications should be addressed to Mr. Hugh M. Smith, general secretary, United States Bureau of Fisheries, Washington, D.C., U.S.A.

At the Institution of Mechanical Engineers on November 16 Mr. Thomas Clarkson read an interesting paper on steam as a motive power for public-service vehicles. The advantages of steam for public-service work were summarised as follows:—the employment of a safe and cheap fuel; freedom from noise and vibration; absence of smell; and absence of change-speed gears, electric ignition, and friction clutch. The maintenance cost of an engine that has been in regular public service on single-deck omnibuses for three years in Devonshire in 1905 was 6.23 pence per mile for total operating expenses, 1.5 pence per mile for tyres, and 1.16 pence per mile for depreciation. Much has been done towards obviating mechanical stops and breakdowns during the past two years, and the steam omnibus of to-day is shown by Mr. Clarkson to be a very satisfactory and trustworthy machine.

IN the first article of the fourth number of the *Journal of Economic Biology* (vol. i.) Prof. A. Nalepa, of Vienna, describes two "eriophyids" (Acari) from Fiji. The first, *Eriophyes hibisci*, forms galls on a species of Hibiscus, of which the second, *Oxypleurites bisetus*, is also a denizen. In the second article Mr. G. H. Carpenter records the occurrence of larva of the chrysomelid beetle *Psylliodes chrysocephala* on cabbage-plants at Limerick. Much damage was done to the cabbages on which the larvæ fed, but the author is of opinion that the occurrence is an unusual one, and that the normal food-plant of the species is different. The third article is devoted to an account, by Mr. R. Newstead, of the life-history of the fly *Stomoxys calcitrans*, the larvæ of which are found in stables, cow-sheds, &c.

IN vol. xvii. of *L'Anthropologie* appears an illustrated paper, by the late Mr. E. Piette, on evidence for the domestication or partial domestication of the horse (and possibly a wild ass) during the Reindeer epoch. This evidence consists of a number of sculptured and incised heads of horses invested with halters or head-stalls. Some of these head-stalls, as shown in the figure of a head from the cave of St. Michel d'Arudy, are of a very complex nature, consisting not only of several strands of rope, but of a piece of buck's horn or bone under the lower jaw. The evidence seems to be conclusive as to the domestication of the horse

during the late Pleistocene epoch, and likewise demonstrates that, as might have been guessed, the head-stall is older than the bit.

THE cruciform brooches of Norway form the subject of a long article by Mr. Haakon Schetelig in the second part of the "Bergens Museum Aarbog" for 1906. Prototypes of these ornaments occur in the peat of Nydam, and are believed to date from about 350 A.D., and they are considered to have been introduced into Norway about the same time, since they are found there in graves containing weapons and implements of the Nydam type. In a second article Mr. O. J. Lie-Pettesen discusses the habits and etiology of Norwegian humble-bees, more especially in connection with the powers of orientating their position and finding their way home. The development of the crustaceans of the genus *Sclerocrangon*, and more especially that of *S. ferox*, discovered in the North Atlantic by the Norwegian expedition of 1876-78, forms the subject of a communication by Mr. Alf Wollebæk. A striking resemblance exists between the development of *Sclerocrangon* and that of *Astacus fluviatilis*, which is remarkable considering the comparatively wide geographical separation of the two forms, and that one is marine and the other freshwater. The concluding paper, by Mr. K. Høye, deals mainly with the mould, *Torula epizoa*, affecting dried cod. Tables are given showing the percentage of spores of this mould in various Norwegian localities, and measures are suggested for preventing its ravages on stores of the fish.

LIEUT.-COLONEL C. D. DURNFORD has a second paper on the flying-fish problem in the November number of the *Annals and Magazine of Natural History*. As was noted in our columns at the time, the author in his original paper (published in the January issue of the aforesaid journal) endeavoured to prove on mathematical grounds that the "aëroplane theory" of the flight of these fishes was a physical impossibility, owing to the relatively small wing-surfaces, and that consequently progression through the air must be due to intensely rapid wing-vibration, aided in certain circumstances by movements of the tail, which in all cases give rise to the initial impetus. In the supplementary communication Colonel Durnford adduces further evidence in favour of his explanation of the phenomenon. Under average conditions, the chief features of the flight appear to be as follows:—(1) the tail-impelled, visibly wing-assisted jump from the water to a height where the wings can work visibly; (2) the flight continued by an intensely rapid and laboured wing-movement, generally mistaken for a condition of rest, and, if seen at all, visible only as a blur; (3) short periods of slowing down of wing-movement, when the vibrations again become perceptible; (4) either sudden cessation of wing-movement, followed by an immediate drop into the water, or a short slow-down into visibility immediately preceding the immersion. The result of careful dissection has been to demonstrate that flying-fish possess much greater development of the pectoral and caudal muscles than non-volant pelagic fishes of similar proportions.

PROF. C. O. WHITMAN has favoured us with a copy of an address (reprinted from vol. v. of the "Congress of Arts and Science, Universal Exposition, St. Louis, 1904") delivered by himself on the problem of the origin of species. It is argued that although Eimer's theory of orthogenesis and the mutation hypothesis of de Vries appear, respectively, to be contradictory to Darwin's natural selection, yet all three, in the professor's opinion, may be reconciled. Mutation may be admitted to be

true in the case of the evening-primrose, but this by no means indicates that it occurs in most other instances. On the contrary, the author affirms that he possesses conclusive evidence that species-forming variation advances in a definite direction (orthogenesis), although there are also variations advancing in different directions (amphigenesis). Orderly variation does not imply teleology, and the orthogenetic progress (of which we have an excellent sample in the development of the dark markings on the wings of pigeons) is the primary and fundamental one. "In its course we find unlimited opportunities for the play of natural selection, escape the great difficulty of incipient stages, and readily understand why we find so many conditions arising and persisting without any direct help of selection."

ON the subject of the variations in the leaves of ferns grown in the sun or in shade, Miss J. H. M'Iroy publishes some notes on the leaves of *Nephrodium Filixmas* and *Scolopendrium vulgare* in the Proceedings of the Royal Philosophical Society of Glasgow, 1906. A marked difference was noted for two plants of *Nephrodium* with regard to the surface area of the leaves, that was twice as large in the case of the shaded plant as on the plant grown in direct sunlight, while the proportion was exactly reversed in the matter of spore output.

THE Sea Island cotton produced in St. Vincent continues to maintain its excellent quality. Mr. W. N. Sands, the agricultural superintendent, states in his annual report for 1905-6 that a considerable quantity realised nineteen and twenty pence per pound. Owing to the refusal of planters in the United States to supply seed of this variety, St. Vincent seed was selected to supply local needs and the requirements of other islands in the West Indies. After cotton, cacao received the most attention, and nutmeg plants were also in request. With respect to shade for cacao trees, the Madura, *Gliricidia maculata*, is preferred in St. Vincent to Immortels, as being less liable to suffer from scale insects.

MR. E. M. FREEMAN, who has published previous papers on the fungus of *Lolium temulentum*, contributes a note on its affinities in *Annales Mycologici*, vol. iv., No. 1, showing that its continued existence in the grass is similar to the propagation of loose smut in wheat and barley. Brefeld and Hecke have observed that a spore of the smut falling on the young ovary of these cereals can produce a mycelium, and later on spores from which germinating tubes pass into the developing embryo. In *Lolium* spores are not formed, but the mycelium persists until the embryo begins to develop and then grows into it. The author suggests that the evolutionary sequence in *Lolium* is later than that in the cereals on the hypothesis that spore formation has been prevented.

THE "Agricultural Statistics of India for the Years 1900-1 to 1904-5" have been published in two volumes, the first dealing with British India and the second with the native States. The statistics have been compiled in the office of the director-general of commercial intelligence, and may be regarded as a trustworthy record of the agricultural industries of India. Running as the volumes do to more than 300 foolscap pages of figures, it is possible only to refer to one or two of the many interesting subjects included. The tables dealing with the area under cultivation and total yield in the case of indigo show that from 1892 to 1900 the number of acres under cultivation was never under a million, and in 1894-5 was nearly a million and three-quarters. During the same period the number

of hundredweights of indigo produced was never less than 112,000, and in 1894-5 reached 238,000. During 1905-6, on the contrary, the number of acres under cultivation fell to 381,000, and the amount of indigo produced to 45,000 cwt. The case of cotton, however, is quite of a different character. The number of acres under cultivation has steadily increased in recent years. In 1899-1900 about 12,000,000 acres were planted, but during 1905-6 the number was well on the way to 21,000,000. The output in bales of 400 lb. increased in a similar manner from 1,090,000 in 1899-1900 to 3,250,000 in 1905-6. The volumes certainly provide a rich storehouse of material for readers interested in Indian affairs.

SEVERAL important papers appear in the October number of the *Journal of Hygiene* (vi., No. 5). Dr. Ashburton Thompson, President of the Board of Health, New South Wales, discusses the epidemiology of plague, particularly the part played by the rat and flea in its transmission; Prof. Nuttall and Dr. Graham Smith contribute an important and exhaustive account of canine piroplasmosis and of the morphology and development of the parasite *Piroplasma canis*; Mr. A. T. MacConkey describes the bacteriology of some cases of food poisoning which have come under his notice; and Mr. J. D. Thomson certain blood parasites of the mole. An interesting instance of spirochaetosis in mice is described by Mr. C. M. Wenyon, and Dr. Andrew Balfour gives some notes on herpetomonas parasites in fleas. Finally, the report of the commission for the suppression of ankylostomiasis in Porto Rico is abstracted. The disease is very prevalent, and probably 90 per cent. of the inhabitants, who number about one million, suffer from it, and are more or less incapacitated. It is estimated that for an expenditure of 20,000l. per annum 100,000 persons could be treated a year.

IN the last volume of the Proceedings of the Institution of Civil Engineers (vol. clxv., session 1905-6, part iii.) an account is given by Mr. Baldwin-Wiseman of a series of investigations made by him during the last three years as to the relationship between the porosity of rocks, and the flow of water through the interstices, under varying pressures. A description and illustration of the apparatus employed also accompanies the paper. The stones selected for experiment range from the Carboniferous to the Cretaceous rocks. The stones were carefully selected and dressed into the form of cylinders 13 inches long and 6 inches in diameter. These blocks were placed in a steel case, and precautions taken to prevent any leakage. The water was supplied from an hydraulic accumulator at varying pressures up to 75 lb. on the square inch. A drop of the piston, which acted in the steel case, of 1 centimetre was equivalent to a discharge of 62.06 cubic centimetres, and the area exposed was such that a discharge of 1 cubic centimetre per second was equivalent to one gallon per hour per square foot of surface. Special attention was given to the question of re-soakage as bearing on the rate and amount of recharging depleted strata after a long-continued drought. The results of the investigations are given in thirteen tables in the appendix to the paper; where also there are two tables showing the geological formation, depth of wells, quantity of water pumped, and other particulars of a large number of waterworks, with details of the filter-beds.

THE report of the Canadian Government Commission appointed to investigate the zinc resources of British Columbia and the conditions affecting their exploitation

has been published by the Mines Department of the Department of the Interior (Ottawa, 1906). It forms a handsome volume of 400 pages, with numerous maps and illustrations. In British Columbia the silver-lead ores occur in close association with zinc ore, which hitherto has proved a detriment to the value of the former. The commission was appointed to arrive at a knowledge of the economic value of the zinc ores. Mr. W. R. Ingalls, an authority on zinc from the United States, was appointed to draw up the report, and Mr. Philip Argall, of Denver, Colorado, and Mr. A. C. Gardé, of Nelson, British Columbia, to act as his assistants. Their report contains a vast amount of authoritative information on the mining and milling of zinc ores. Some of the undeveloped zinc deposits of British Columbia are reported upon by Dr. A. E. Barlow, of the Dominion Geological Survey. The possibility of enriching the zinc ores of British Columbia to a high degree by magnetic separation is thoroughly demonstrated by the tests conducted by the commission. In every case it has been possible to produce a zinc concentrate assaying upwards of 40 per cent. of zinc, and in some cases as much as 57 per cent. of zinc. Magnetic separators should be of the high-intensity type, and means for roasting the ore are required. The Blake electrostatic separator proved unserviceable for these ores, which appear, however, to be amenable to separation by flotation processes. Electric smelting of the zinc ores is not advocated, as this process must undoubtedly go through many stages of experiment before it can be pronounced a metallurgical and commercial success. Smelting with Canadian coal is, however, quite feasible commercially. Zinc ores are widely distributed, and the situation is excellent for the creation of a zinc industry in British Columbia.

AN interesting contribution to the study of pseudo-solution, dealing in particular with the colloidal forms of ferric hydroxide, is made by F. Giolitti in two papers published in the *Gazzetta* (vol. xxxvi., ii, pp. 157 and 433). When ferric hydroxide, freshly precipitated by ammonia and thoroughly washed with water, is examined microscopically, it appears to consist of homogeneous gelatinous masses. After being left in contact with water during several months, minute "nuclei" form in the gelatinous particles, and on adding acetic acid the gelatinous portion dissolves, leaving behind the "nuclei" in the form of minute spheres of a nearly uniform diameter of about 7 μ . These nuclei, after being allowed to settle, form with pure water pseudo-solutions which are characterised by being coagulable by dilute nitric acid. A definite concentration of nitric acid necessary to produce coagulation corresponds to each concentration of the colloidal solution. The pseudo-solutions of ferric hydroxide prepared by different methods have different physical and chemical properties; different solutions of the same concentration have, for instance, different absorption spectra. With some solutions the addition of nitric acid causes the hydroxide to dissolve as nitrate, whilst with others a coagulation of the "hydrosol" is obtained. With precipitated tungstic acid very remarkable phenomena are observed. On washing the freshly prepared material very thoroughly with water, suspensions are obtained which, after being left during several days, separate into a number of well-defined strata, differing in colour and degree of opalescence. From these different strata pseudo-solutions can be prepared which at the same concentration have different limits of stability in presence of a coagulating agent such as nitric acid. The explanation given of these phenomena is that the different pseudo-solutions contain particles of different magnitude or molecular complexes

of a different character; the latter view appears necessary to explain the variation in chemical activity.

IN the formula given in last week's NATURE (p. 85) for converting Fahrenheit to centigrade degrees, the minus signs should have been plus; thus

$$C = \left(\frac{1}{2} + \frac{1}{2} \cdot \frac{1}{10} + \frac{1}{2} \cdot \frac{1}{100}\right) (F - 32).$$

Though the formula was incorrectly stated, the example given of its use showed plainly that a plus sign was intended.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN DECEMBER:—

- Dec. 3. 3h. Jupiter in conjunction with Moon. Jupiter $1^{\circ} 58' N.$
 „ 10h. 36m. to 11h. 10m. Moon occults ζ Geminorum (variable).
 5. 11h. 15m. Minimum of Algol (β Persei).
 8. 8h. 4m. Minimum of Algol (β Persei).
 10–12. Epoch of Geminid meteoric shower (Radiant $108^{\circ} + 33^{\circ}$).
 9. 6h. Venus in conjunction with β' Scorpii.
 13. 2h. Mercury and Venus in conjunction. Mercury $0^{\circ} 49' N.$
 „ 18h. 1m. to 19h. 28m. Transit of Jupiter's Sat. IV. (Callisto).
 „ 19h. Venus in conjunction with Moon. Venus $2^{\circ} 40' S.$
 15. Venus. Illuminated portion of disc = 0.075; of Mars = 0.938.
 19. 4h. 40m. to 5h. 39m. Moon occults γ Capricorni (mag. 3.8).
 „ 8h. 32m. to 8h. 54m. Moon occults δ Capricorni (mag. 3.0).
 20. 13h. Saturn in conjunction with Moon. Saturn $1^{\circ} 15' N.$
 24. 3h. 26m. to 6h. 26m. Transit of Jupiter's Sat. III. (Ganymede).
 25. Saturn. Major axis of outer ring = $38'' \cdot 59$; minor axis = $3'' \cdot 79$.
 „ 10h. 59m. to 12h. 12m. Moon occults μ Ceti (mag. 4.4).
 28. 3h. Jupiter in opposition to the Sun.
 „ 9h. 46m. Minimum of Algol (β Persei).
 30. 8h. 6m. to 9h. 37m. Transit of Jupiter's Sat. IV. (Callisto).
 31. 6h. 35m. Minimum of Algol (β Persei).
 „ 6h. 41m. to 9h. 41m. Transit of Jupiter's Sat. III. (Ganymede).

COMETS 1906g (THIELE) AND 1906h (METCALF).—Further observations of comets 1906g and 1906h are recorded in No. 4134 of the *Astronomische Nachrichten*. Prof. Hartwig, observing at Bamberg on November 11, found that 1906g was of circular form with a diameter of $2'$, having a central condensation $1'$ in diameter and of the tenth magnitude. On November 14 the condensation was very hazy and difficult to measure, whilst the total magnitude was about 9.0. Several sets of elements and ephemerides are published in the same journal, and the following is an extract from the ephemeris computed by Dr. E. Strömgren:—

Ephemeris 12h. M.T. Berlin.				
1906	α (true) h m.		δ (true)	Brightness
Nov. 30	11	8	39 1	...
Dec. 2	11	22	41 34	1.3
„ 4	11	38	43 59	...
„ 6	11	54	46 14	1.2

Brightness at time of discovery = 1.0 (=mag. 8.5).

The comet is now circumpolar, and apparently travelling in a line roughly parallel to, and south of, that joining ψ and χ Ursæ Majoris.

Comet 1906h is so faint that it may only be observed with large telescopes.

PHOTOGRAPHIC OBSERVATIONS OF GIACOBINI'S 1905 COMET.—Some excellent photographs of comet 1905c, taken with the 10-inch Brashear doublet of the Yerkes Observatory by Prof. Barnard, are reproduced in No. 4, vol. xxiv., of the *Astrophysical Journal*. That secured on December 29, 1905, shows a great deal of structure in a tail $4\frac{1}{2}^{\circ}$ long. Joined to the comet's head by a narrow neck, this tail first broadens out and then narrows again, its well-defined edges thus presenting a peculiar convex appearance. The photograph taken on January 7, 1906, shows an even greater amount of structure, a large number of thread-like strands diverging from a position about 1° from the head. Although the tail of this comet was subject to great physical changes, Prof. Barnard considers that all the phenomena were due entirely to the solar action, there being no evidence of any outside distorting influence such as was suspected in the case of Brooks's comet (1903 IV.).

SUN-SPOTS AND MAGNETISM.—A retrospect of the stages whereby our present knowledge of the relation between sun-spots and terrestrial magnetism has been advanced at Greenwich is published in the *Observatory* (No. 376) by Mr. William Ellis. For a long period Mr. Ellis had charge of the magnetic observations at Greenwich, and he describes steps of advance in which he took an actual part. These observations were commenced at Greenwich, and in several of our colonies, in 1840, and in September of the next year there occurred a considerable magnetic storm which was clearly shown to have commenced simultaneously in widely separated parts of the Empire, thereby suggesting an external independent cause. By the year 1852 General Sabine, from a discussion of the collected results, was able to suggest that this common cause was probably intimately connected with solar phenomena. Mr. Ellis proceeds to discuss the observations of both solar and magnetic phenomena, giving a number of direct references which should prove both interesting and useful to other observers.

THE SOLAR ECLIPSE OF NEXT JANUARY.—The Tashkent Observatory has issued a map of Turkestan showing the path of the moon's shadow during the total solar eclipse which will take place on January 13, 1907. In the circular accompanying the map a series of meteorological observations is given, and these show that the prospects of a clear sky during the eclipse are not particularly favourable. So far as is yet known, three expeditions, one each from the Pulkowa and Hamburg Observatories, and one from the Bureau des Longitudes, are going to Samarkand (*Astronomische Nachrichten*, No. 4133).

NAKED-EYE OBSERVATIONS OF VENUS.—In the November number of the *Bulletin de la Société astronomique de France* M. A. Benoit discusses numerous recorded instances of the crescent form of Venus having been seen by the unaided eye. To determine the question of the probability of such an observation being possible, a number of observations was especially made at the Juvisy Observatory during the period March–June, 1905. Although on one occasion the observers thought they certainly saw the crescent, subsequent examination with field glasses showed them to have been mistaken, and from the complete discussion M. Benoit concludes that this naked-eye observation is impossible.

THE INTERNATIONAL CHART AND CATALOGUE.—As the completion of the international scheme for charting the heavens is now within sight, a correlated history of its inception and prosecution should prove of general interest. Such an account is given, in German, in No. 48, vol. v. (new series), November 25, 1906, of the *Naturwissenschaftliche Wochenschrift* by Dr. H. Ludendorff, and is illustrated by engravings of the instruments and a reproduction from a portion of one of the Potsdam plates.

THE PERSEIDS, 1906.—In No. 10, vol. xxxv., of the *Memorie della Società degli Spettroscopisti*, Prof. Zammarchi records the results of the meteor observations made on the nights of August 10–14 at the Vescovile di Brescia Observatory. In all, 231 Perseids were observed, and for the majority of these the paths, brightness, colour, &c., are recorded. Many of the meteors left persistent trails, and two of them apparently followed zigzag paths.